$+70=0$ by p, $p^4-39s^2=-70p$. Adding to both sides $25p^2+49$, we have $p^4-14p^2+49=25p^2-70p+49$, whence $p^2-7=\pm(5p-7)$ and $p=2$, 5, or -7; hence $s=6$, $-4\frac{1}{2}$, or 18. [Or, from $p^3-39p+70=0$, we have $(p-5)(p^2+5p-14)=0$. $\therefore$ $p=5$, 2, or -7, $s=6, -4\frac{1}{2}$, or 18.]

$\therefore$ $x+y=5$, $xy=6$, $\therefore$ $x=3$ or 2, $y=2$ or 3.

$x+y=2$, $xy=-4\frac{1}{2}$, $\therefore$ $x=\frac{1}{2}(2\pm\sqrt{22})$, $y=\frac{1}{2}(2\pm\sqrt{22})$.

$x+y=-7$, $xy=18$, $\therefore$ $x=\frac{1}{2}(-7\pm\sqrt{-23})$, $y=\frac{1}{2}(-7\pm\sqrt{-23})$.

$\therefore$ There are six values for x and six values for y admissible.

III. Comment by H. W. DRAUGHON, Olio, Mississippi.

The problem can not be solved by quadratics as may be shown thus: The resulting literal equation $p^3-3ap+2b=0$ can not be solved by quadratics, and therefore the given equations can not be solved by quadratics. Cubics of this class can be *apparently* solved by quadratics, when they have one commensurable root. Let r be one root of the equation $p^3=3ap-2b$, for instance. Subtracting r^2p from both members gives $p^3-r^2p=(3a-r^2)p-2b$. Obviously both members of this equation can be divided exactly by $p-r$, giving a quadratic equation, but before this subtraction can be made we must find r, which can not be done by quadratics. If we substitute the definite values for a and b we readily complete the solution.

Also solved by *A. H. Bell*, *P. S. Berg*, *D. G. Durrance, Jr.*, *H. W. Draughon*, *F. P. Matz*, *G. B. M. Zerr*, *J. F. W. Scheffer*, *C. D. Schmitt*, and *H. C. Wilkes*.

PROBLEMS.

50. Proposed by LEONARD E. DICKSON, M. A., Fellow in Mathematics, University of Chicago.

Given $b=a\sqrt{-1}.\tan\frac{m\pi}{n}$, m being an arbitrary integer, find the simplest *real* relation between a and b.

51. Proposed by J. W. NICHOLSON, LL. D., President and Professor of Mathematics, Louisiana State University and A. and M. College, Baton Rouge, Louisiana.

Solve the equation $x^5+5mx^3+5m^2x+n=0$.